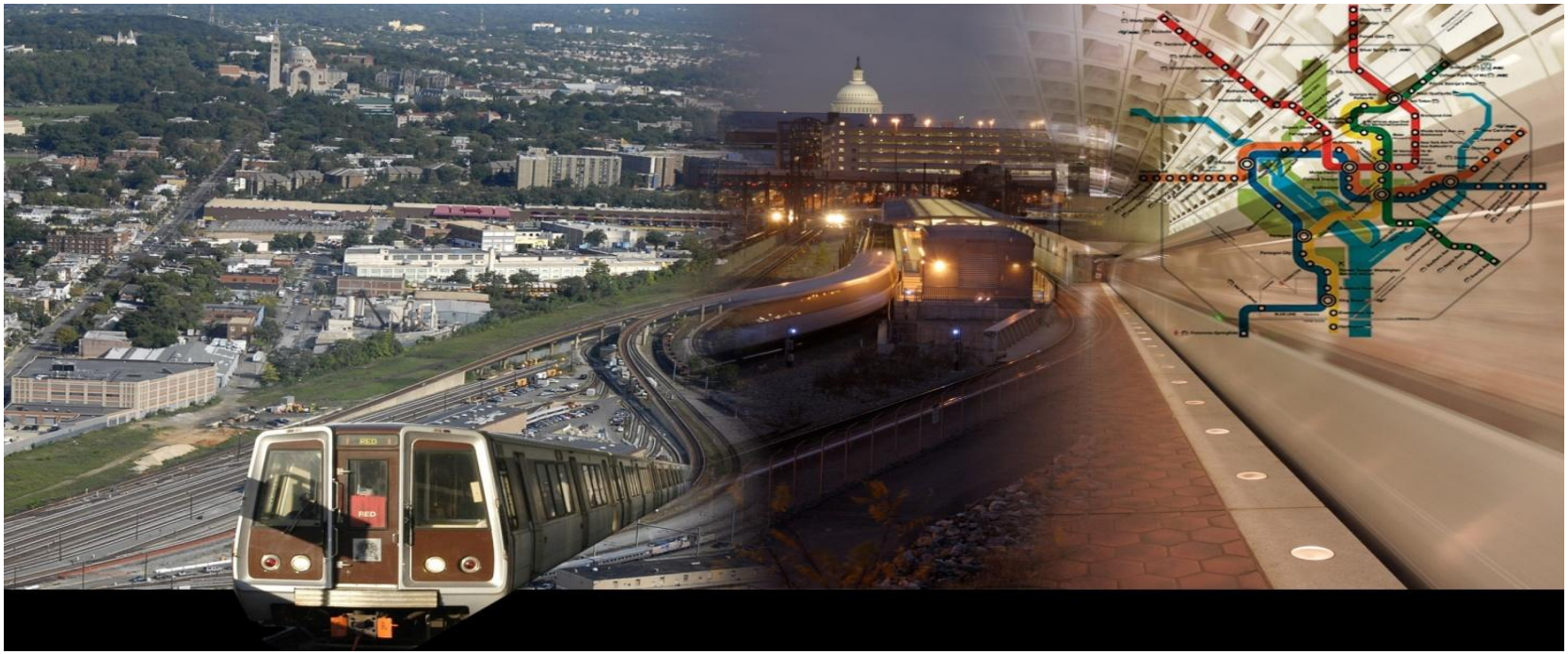
Best Practices for Managing Asset Life Cycle Cost



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (WMATA)

Background

- Metrorail
  - Size -106.3 miles and 86 stations
  - Annual Ridership – 217 million trips
  - Average Weekday Ridership – 744 thousand
  - Fleet Size – 1,142 rail cars
- Metrobus
  - Size – 323 routes on 169 lines
  - Annual Ridership - 125 million trips
  - Average Weekday Ridership – 436 thousand
  - Fleet Size – 1,536 buses

Background

- MetroAccess
  - Size – provides trips that begin and end less than 3/4 of a mile from a Metrorail station or bus route within the Washington Metropolitan Area Transit Zone
  - Annual Ridership - 2.3 million trips
  - Average Weekday Ridership - 7 thousand
  - Fleet Size – 600

- FY2013 Budget
  - Capital Budget - $905 million
  - Operating Budget - $1.576 billion

Asset Life Cycle Cost

Complete View of Asset Life Cycle Cost

Capturing Asset Life Cycle Cost

Operation and Maintenance Cost (Maximo and other systems)

- Routine Cost - Maintenance Cost
- Service Disruption

Age and Reliability (Capital Budget Request – Decision Lens)

Asset Replacement/Renewal/Disposition (PeopleSoft)

Life Cycle Management Process

Policies, Procedures, and Management

Inventory of Assets

Data Collection and Condition Assessment

Third Party Condition (TGV, Holland, Sperry, Etc.)

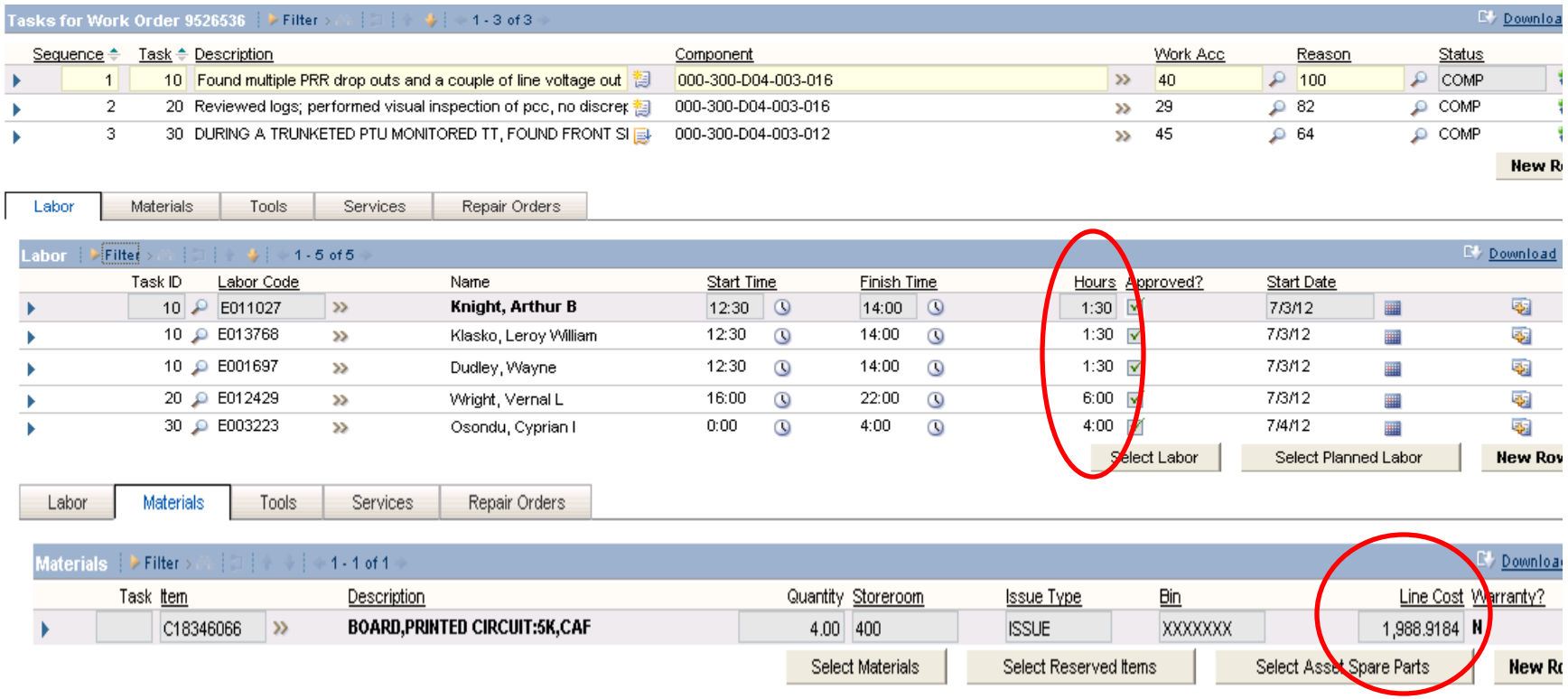
Work (Corrective and Preventive)

Inspection (Track Walker)

Method to Store and Analyze

Maximo
PeopleSoft
Fleet Watch
Rail Performance Monitoring
Optram

Example of Cost Collection



Tasks for Work Order 9526536 | Filter | 1 - 3 of 3 | Download

Sequence	Task	Description	Component	Work Acc	Reason	Status
1	10	Found multiple PRR drop outs and a couple of line voltage out	000-300-D04-003-016	40	100	COMP
2	20	Reviewed logs; performed visual inspection of pcc, no discrep	000-300-D04-003-016	29	82	COMP
3	30	DURING A TRUNKETED PTU MONITORED TT, FOUND FRONT SI	000-300-D04-003-012	45	64	COMP

New R

Labor | Materials | Tools | Services | Repair Orders

Labor | Filter | 1 - 5 of 5 | Download

Task ID	Labor Code	Name	Start Time	Finish Time	Hours	Approved?	Start Date
10	E011027	**Knight, Arthur B**	12:30	14:00	1:30	✓	7/3/12
10	E013768	Klasko, Leroy William	12:30	14:00	1:30	✓	7/3/12
10	E001697	Dudley, Wayne	12:30	14:00	1:30	✓	7/3/12
20	E012429	Wright, Vernal L	16:00	22:00	6:00	✓	7/3/12
30	E003223	Osondu, Cyprian I	0:00	4:00	4:00	✓	7/4/12

Select Labor | Select Planned Labor | New Rov

Labor | Materials | Tools | Services | Repair Orders

Materials | Filter | 1 - 1 of 1 | Download

Task	Item	Description	Quantity	Storeroom	Issue Type	Bin	Line Cost	Warranty?
	C18346066	**BOARD,PRINTED CIRCUIT:5K,CAF**	4.00	400	ISSUE	XXXXXXX	1,988.9184	N

Select Materials | Select Reserved Items | Select Asset Spare Parts | New Ro

Example of Cost Collection

List | Asset | Purchasing | Spare Parts | Warranties | Measurement Points | Safety | Meters | Specification

Asset Name: B2000

Asset: B2000 — 2000, BUS, ORION VI, LOW FLOOR, 40.8 FOOT, FLEET 25

Belongs To:

Domicile Location: 6046 — T38, CARMEN TURNER FACILITY, PENNSY DR BUS STORAGE

Operational Status: REM FR SER — REMOVED FROM SERVICE

Status Reason: STORAGE — PLACED IN RESERVE

Facility Location:

Tag/Alias:

Barcode:

Rail Car Restriction

Position:

Line:

Yard:

RPM Restriction:

Restriction Date:

Chain Marker Location

Start Location

Chain Marker:

Offset(ft):

Y-Offset(ft):

Maintenance Office: BMNT-BMNT-ADMN — BUS MAINTENANCE ADMINISTRATION

Owning Office: BMNT-BMNT-BMNT — BUS MAINTENANCE

Maintenance Cost

Total Cost: 137,811.1200

YTD Cost: 76,585.5000

Details

Year: 2000

Make: ORION VI

Example of Data Analysis of Cost

	Fleet Age		SUBFLEET		Miles	Fuel Gallons	Fuel $ Cost	Fuel Cost	Total $ Cost	Avg MPG	Cost Per Mile (Includes Labor, Materials, Tools, Services, Fuel,
2006	4	CLEAN DIESEL	New Flyer (2006) 61, 6200 Clean Diesel	FLEET 37	4,310,550	1,217,383	2,678,243	2.20	5,228,167.35	3.54	$ 1.21
2001	9	CNG	New Flyer (2001-2002) 23, 2400 CNG	FLEET 28	4,871,058	1,991,662	3,345,993	1.68	6,135,726.45	2.45	$ 1.26
2002	8	CNG	New Flyer (2002) 2400 CNG JOhn Deere	FLEET 29	110,667	44,950	75,516	1.68	120,085.96	2.46	$ 1.09
2005	5	CNG	Orion VII (2005) 2500 CNG 40ft. Cummins	FLEET 31	3,824,621	1,180,451	1,983,157	1.68	4,225,234.08	3.24	$ 1.10
2005	5	CNG	Orion (2005) 3000 30ft.	FLEET 32	938,326	314,872	528,985	1.68	1,078,278.84	2.98	$ 1.15
2005	5	CNG	Orion VII (2005) 2616-2685 CNG John Deere	FLEET 33	2,085,381	607,352	1,020,352	1.68	2,413,499.36	3.43	$ 1.16
2005	5	CNG	Orion VII (2005) 2700 40ft.	FLEET 34	1,175,675	280,598	471,405	1.68	1,039,564.11	4.19	$ 0.88
2007	3	CNG	New Flyer 2800 CNG	FLEET 38	384,527	178,735	300,274	1.68	807,572.52	2.15	$ 2.10
2008	2	CNG	NABI 5400 60 FT BRT	FLEET 39	347,383	200,932	337,565	1.68	773,291.41	1.73	$ 2.23
1997	13	DIESEL	Orion V (1997) 42, 43, 44/40ft	FLEET 22	4,203,651	1,095,606	2,410,332	2.20	5,542,466.22	3.84	$ 1.32
1997	13	DIESEL	Orion V (1997) 30ft.	FLEET 23	1,361,595	423,901	932,582	2.20	2,112,806.29	3.21	$ 1.55
2000	10	DIESEL	Orion VI (2000) Low Floor	FLEET 25	2,229,177	571,538	1,257,383	2.20	2,977,243.38	3.90	$ 1.34
2000	10	DIESEL	Orion V (2000) 2100 40ft.	FLEET 26	3,015,386	923,979	2,032,754	2.20	4,295,457.25	3.26	$ 1.42
2003	7	DIESEL	Neoplan (2003) 5300 60ft.	FLEET 30	326,428	158,828	349,422	2.20	714,051.81	2.06	$ 2.19
2006	4	HYBRID	New Flyer (2006) 6000 Hybrid	FLEET 27	1,887,460	421,346	926,962	2.20	1,923,000.56	4.48	$ 1.02
2009	1	HYBRID	New Flyer 37ft Hybrid	FLEET 42	539,881	132,552	291,615	2.20	544,160.15	4.07	$ 1.01
2009	1	HYBRID	New Flyer BRT (6301-6461)	FLEET 43	4,945,896	1,137,171	2,501,776	2.20	4,716,552.39	4.35	$ 0.95
2009	1	HYBRID	New Flyer BRT 62ft (5431-5452)	FLEET 44	618,085	157,977	347,549	2.20	694,248.70	3.91	$ 1.12
2010	0	HYBRID	New Flyer BRT (6462-6609)	FLEET 45	5,620,133	1,336,303	2,939,866	2.20	4,925,327.25	4.21	$ 0.88

Management of Life Cycle Cost – Key Component

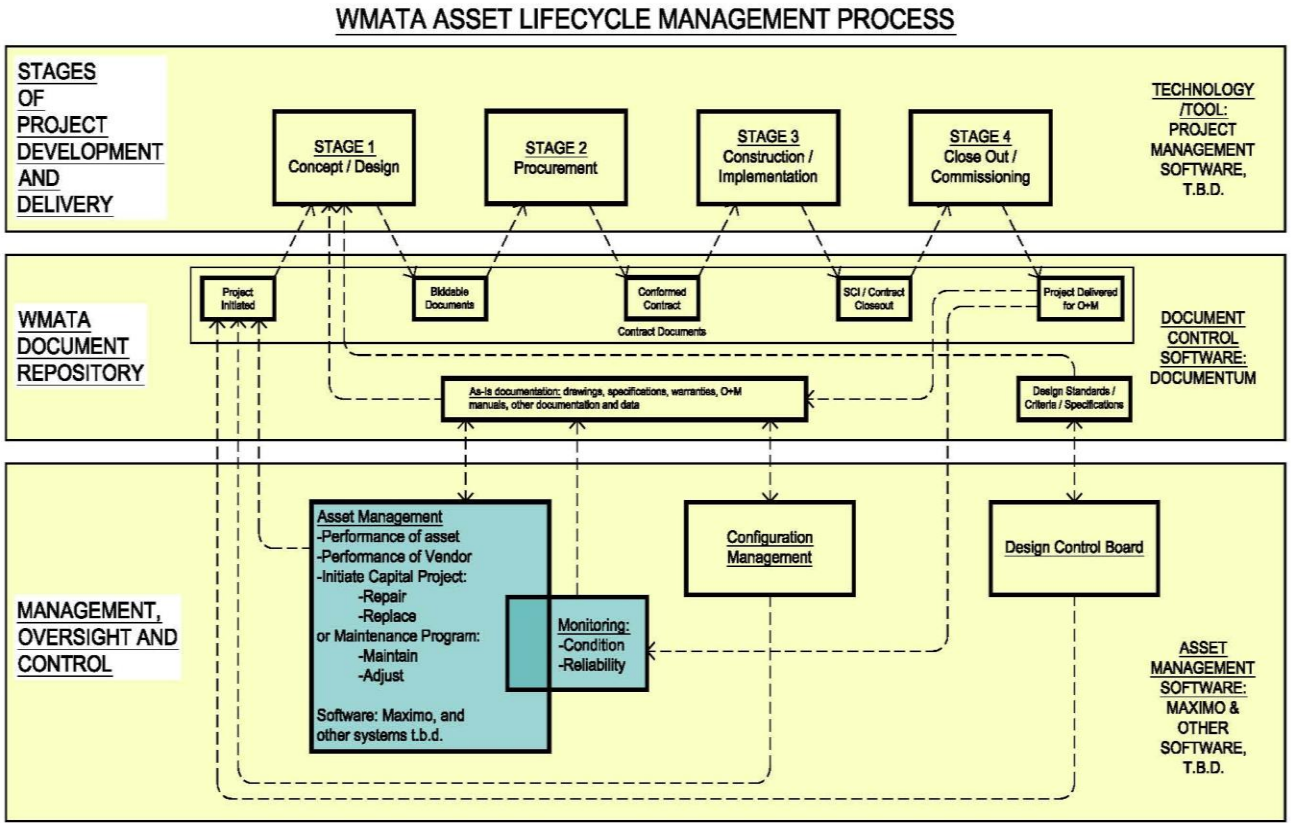
1. Ability to identify the lowest maintainable element

2. Investigation of Service Disruptions to determine causes
   - Reliability Analysis
   - Engineering Modifications to improve reliability

Benefits and Challenges

- Benefits
  - Ability to track rising operating and maintenance cost
  - Ensures that prescribed maintenance is done
  - Ability to direct resources to priority needs
  - Have a database of the asset life expectancy based on age
- Challenges
  - Ability to identify the lowest maintainable asset element, similar to rolling stock
  - Refine asset life expectancy based on performance
  - Determining the optimal schedule to perform the optimal work

Capturing asset life-cycle cost - Future



Capturing Asset Life Cycle Cost - Future

Operation and Maintenance Cost (Maximo)

- Routine Cost - Maintenance Cost - Service Disruption

More Monitoring and Reliability Analysis on Asset Components (influence projects submitted during Budget Call)

Asset Replacement/Renewal/Disposition (PeopleSoft)

Benefits and Challenges - Future

- Benefits
  - Able to identify rising operating and maintenance cost by lowest maintainable element of the asset
  - Historical data
    - Based on performance instead of age and service disruption
- Changes
  - Establish enterprise wide policies and procedures
  - Set performance standards and operational goals for the lowest maintainable element of the asset
    - Including infrastructure assets
  - Monitor performance
  - Predict preventive maintenance needs
  - Determine the optimal schedule to perform the optimal work